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XIV.

E X P E R I M E N T S

ON THE

D I P P I N G N E E D L E ,

MADE BY DESIRE OF THE

R O Y A L S O C I E T Y .

BY

T H O M A S H U T C H I N S .

REDDE, FEBRUARY 16, 1775.

EXPERIMENTS ON THE DIPPING NEEDLE.

Stromness in the isles of Orkney, lat. $58^{\circ} 59'$ North,
long. $3^{\circ} 30'$ West from London, June 9, 1774.

◦ ◦

75	50	The index placed East.
76	◦	
75	45	
75	45	
75	40	The index placed West.
74	55	
75	◦	
75	20	
75	25	The poles of the needle changed, the index placed West.
75	25	
76	10	
76	15	
76	25	The index facing the East.
77	◦	

In these observations the needle was placed horizontal, and the vibration continued between nine and ten minutes. The instrument was set in the middle of a room up one pair of stairs; but being apprehensive that the iron-grate, fender, poker, and tongs, might, in some measure, affect the needle, I determined to make a trial in the open air, and in a place free from such obstacles.

EXPERIMENTS ON THE DIPPING NEEDLE.

On the Holms in the entrance of Stromness Harbour,
 June 23, 1774. Variation *per azimuth* 24° Westerly.
 Long. from London $3^{\circ} 30'$ West, lat. $58^{\circ} 59'$ North.

$76^{\circ} 0'$
 $75^{\circ} 40'$
 $75^{\circ} 45'$
} The index placed West.

$76^{\circ} 55'$
 $76^{\circ} 10'$
 $76^{\circ} 30'$
} The index placed East.

$74^{\circ} 45'$
 $75^{\circ} 30'$
 $75^{\circ} 0'$
} The poles changed, and index East.

$76^{\circ} 0'$
 $74^{\circ} 45'$
 $75^{\circ} 0'$
} The index placed West.

The needle in all these observations was left to vibrate
 from an horizontal position. The instrument was set
 on the top of the case (in which it was packed) and stood
 in the open air, in a fine sunny day.

EXPERIMENTS ON THE DIPPING NEEDLE.

In Hudson's Straits, July 23, 1774, lat. $62^{\circ} 3'$ North,
long. 69° West from London, variation 43° Westerly.

*

82 50 }
 82 30 } The Index placed East.
 82 40 }

81 50 }
 82 45 } The index placed West.
 83 45 }
 82 40 }

The needle vibrated from an horizontal situation. These observations were made on a large piece of ice, to which the three ships were grappled. I imagine the first four experiments may be depended on, as it was calm weather; but afterwards, a breeze springing up gave the ice a circular motion, which made it impossible to keep the instrument exactly in the magnetic meridian, as may be seen in the fifth and sixth experiments. I re-adjusted the instrument for the last observation; but finding the ice still continued in motion, I judged it unnecessary to make any farther experiments at this time, as it could not be done with that exactness I could wish, or give satisfaction to the learned Society to whom I have the honour of transmitting these remarks.

EXPERIMENTS ON THE DIPPING NEEDLE.

In Hudson's Straits, July 27, 1774, lat. $62^{\circ} 23'$ North,
long. $71^{\circ} 30'$ West from London, variation $42^{\circ} 50'$
Westerly *per azimuth*.

◦ ,

81 45 }
83 12 } The index placed East.
82 12 }

83 0 }
82 45 } The index placed West.
83 45 }

83 30 }
84 0 } The poles changed, and index West.
83 35 }

85 0 }
83 25 } The index placed East.
83 45 }

I met with the same impediment as in the last trial of the instrument, the field of ice turning round, so as to remove the needle constantly out of the magnetic meridian; however, I endeavoured to be exact, and re-adjusted the position of the instrument twice during the observations.

EXPERIMENTS ON THE DIPPING NEEDLE.

In Hudson's Straits, July 28, 1774, lat. $62^{\circ} 25'$ North,
 long. $71^{\circ} 30'$ West from London, variation *per azimuth* 44° West.

° ,

$83^{\circ} 0'$ } The index pointing West.
 $83^{\circ} 0'$ }

$83^{\circ} 30'$ } The index pointing East.
 $83^{\circ} 0'$ }

$81^{\circ} 30'$ } The poles changed, and index East.
 $81^{\circ} 40'$ }

$82^{\circ} 8'$ } The index pointing West.
 $82^{\circ} 0'$ }

These observations were made with the assistance of Captain Richards, on a table in the cabbin of the Prince Rupert. We used all imaginary care to render them exact; yet, at the conclusion, I found the ship, though fast to a field of ice, had altered the position of her head: for by placing the index to the North line of the instrument, the needle stood at $88^{\circ} 10'$ West, instead of being perpendicular at 90° .

EXPERIMENTS ON THE DIPPING NEEDLE.

In Hudson's Bay, August 14, 1774, lat. $56^{\circ} 53'$ North,
 long. $85^{\circ} 22'$ West from London, variation *per azimuth* 24° West.

o }

82 o } The index placed East.
 82 o }

82 15 } The index placed West.
 82 20 }

82 50 } The poles changed, and index East
 82 35 }

82 30 } The index placed East.
 82 15 }

These experiments were made in conjunction with Captain Richards, in the cabbin of the Prince Rupert, whilst she lay amongst ice. The ship frequently varied the position of her head a point of the compass; but by replacing the instrument as often as we found occasion, I have the greatest reason to think these obsevations (which took up above three hours) are pretty accurate.

EXPERIMENTS ON THE DIPPING NEEDLE.

At Moose Fort in Hudson's Bay, September 8, 1774, lat.
 $51^{\circ} 20'$ North, long. $82^{\circ} 30'$ West from London,
 variation 17° West.

$80^{\circ} 25'$	The index placed West.
$80^{\circ} 15$	
$80^{\circ} 35$	
$79^{\circ} 0$	
$80^{\circ} 30$	The Index placed East.
$81^{\circ} 25$	
$80^{\circ} 13$	
$81^{\circ} 13$	
$79^{\circ} 10$	The poles reversed, index East.
$80^{\circ} 45$	
$79^{\circ} 50$	
$79^{\circ} 10$	
$79^{\circ} 10$	The index placed West.
$80^{\circ} 25$	
$79^{\circ} 45$	
$80^{\circ} 5$	

The observations were made on shore. So remarkable difference between them, when I was expecting quite the reverse, surprized me as much as the increased inclination of the needle from observations made nearly in the same parallel of latitude in London. I endeavoured, by drawing a magnetical meridional line with chalk, and paying the greatest attention to keeping the instrument perfectly steady and horizontal, to render these experiments accurate, and fulfil the intention of the Royal Society.

EXPERIMENTS ON THE DIPPING NEEDLE.

At Albany Fort in Hudson's Bay, September 14, 1774,
 long. $82^{\circ} 30'$ West, lat. $52^{\circ} 22'$ North, variation 17°
 West.

° °

80 13
 80 25
 79 37
 79 55

I made a trial of the instrument at this place, but having lost the slip of paper on which I had noted the experiments, I was dubious whether I should insert the above or not. I can only recollect these four, and am not positive which way the index stood; however, I remember that the mean of all the observations I made was something less than 80° . Time will not permit me to repeat the operation during the ship's stay in these parts; I must therefore defer it to a future period. During the winter, I shall have frequent opportunities of amusing myself this way; and the respect I bear the Royal Society, makes every service I render to that illustrious body an additional happiness to

Their devoted servant,

Albany Fort,
 September 17, 1774.

THOMAS HUTCHINS

O B S E R -

OBSERVATIONS ON HOY, 1774.

Month.	Hour.	Barome- ter.	Thermo- meter.	Weather.	Circumstances.
1774. June 11.	0 15	28,63	59	Clear.	On the top of the hill.
	0 30	28,60	56½	Foggy.	Ditto.
	4 15	30,22	63	Clear.	At low water mark.

Hoy is a remarkable high hill near Stromness, in the Orkneys, and is placed by Mr. MACKENZIE in lat. $58^{\circ} 58'$ North, and long. $3^{\circ} 30'$ West from London. The two first observations were made on the highest part of the hill. Soon after the first, a fog was seen below arising from the water, at length it reached the summit of the hill; the air seemed very raw and cold to the touch, and the instruments shewed as in the second observation. The barometer continued at 28,60 inches after the fog was gone off, but the thermometer rose two or three degrees. The last observation was made at low water mark, about half a mile from the bottom of the hill. THOMAS HUTCHINS.

"The height of Hoy above low-water mark, according to these observations should be 249,93 fathoms, or as near as may be 500 yards, neglecting the correction for the difference that may be supposed in the temperature of the quicksilver at the two stations, the quantity of which is uncertain." S. HORSLEY.